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MAR 15 1993 Sta. 21 (20)

ENGINEERING DATA TRANSMITTAL

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15. DATA TRANSMITTED

(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	(F) Impact Level	(G) Reason for Transmittal	(H) Originator Disposition	(I) Receiver Disposition
1	WHC-SD-EN-AP-123		0	Sodium Dichromate ERA Cleanup - Sampling and Analysis Plan	3Q	2		

16. KEY

Impact Level (F)	Reason for Transmittal (G)	Disposition (H) & (I)
1, 2, 3, or 4 (see MRP 5.43)	1. Approval 2. Release 3. Information 4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)	1. Approved 2. Approved w/comment 3. Disapproved w/comment 4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION (See Impact Level for required signatures)

(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(J) Name	(K) Signature	(L) Date	(M) MSIN	(G) Reason	(H) Disp.
1	1	Cog.Eng. P. J. Valcich	[signature]	3-10-93	H6-04	C. E. Heiden	C.E. Heiden	3/10/93	H6-04	1	1
1	1	Cog. Mgr. G. C. Henckel	[signature]	3-10-93	H6-04	R. C. Roos			H6-04	2	
1	1	QA T. L. Bennington	for [signature]	3/10/93	H4-16	D. R. Baker			X7-02	2	
2		Safety D. B. Tullis			L6-57	H. D. Downey			H6-27	2	
2		Env. K. A. Gano			X0-21	R. P. Henckel			H6-02	2	
2		EDMC (2)			H6-08	D. G. Kachele			S4-67	2	
2		ERC			H6-07	W. L. Johnson			H6-04	2	

18.	19.	20.	21. DOE APPROVAL (if required)
C. E. Heiden [signature] 3/10/93 Signature of EDT Originator Date	Authorized Representative Date for Receiving Organization	[signature] 3/10 G. C. Henckel Cognizant/Project Engineer's Manager Date	Ltr. No. [] Approved [] Approved w/comments [] Disapproved w/comments

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BD-7400-172-1 (07/91)

SUPPORTING DOCUMENT			1. Total Pages 32
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5. Key Words APPROVED FOR PUBLIC RELEASE 3/15/93 D. Soli	6. Author Name: P. J. Valcich PJ Valcich Signature Organization/Charge Code 81351/PE521		

7. Abstract

Valcich, P. J., 1993, *Sodium Dichromate ERA Cleanup - Sampling and Analysis Plan*, WHC-SD-EN-AP-123, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

9. Impact Level 3Q

10. RELEASE STAMP

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CONTENTS

1.0 INTRODUCTION

The Sodium Dichromate Barrel Landfill is located in a small depression between the 100-D and 100-H areas (Figure 1). The site was used in 1945 for disposal of empty crushed barrels. Limited characterization activities confirmed the presence of buried empty barrels (WHC 1992). A variety of homestead debris (tin cans, wire, etc.) were also found on the site. The overall area of concern is approximately 1,540 by 300 ft.

Geophysical investigations have identified approximately 144 isolated anomalies. Eleven major anomalies referred to as zones indicated potential high concentrations of buried debris (Figure 2). Two of the zones were confirmed to contain crushed, empty, sodium dichromate barrels. These 11 zones will be excavated with a large trackhoe removing the debris. Crushed barrels are the targeted debris for removal. Characterization activities have also shown some anomalies to be only natural geologic features. Remaining isolated anomalies will be excavated with a small backhoe.

2.0 SCOPE OF WORK

This sampling and analysis plan supports the Sodium Dichromate Barrel Landfill Expedited Response Action (ERA) cleanup activities (WHC 1992) and Action Memorandum recommendations. It provides guidance for field personnel. Identified anomalies will be excavated and debris (i.e., crushed barrels) removed from the site. The sampling plan scope includes field screening and sample collection (offsite laboratory analysis) of soils from excavated sites. Field screening and laboratory data will support clean closure.

3.0 HEALTH AND SAFETY

The cleanup activities will have site-specific safety documentation in accordance with Environmental Investigation Instruction (EII) 2.1, Preparation of Hazardous Waste Operation Permits (WHC 1988). All safety-related documents will be reviewed and approved by Independent Safety. The document will be addressed in a pre-job safety meeting prior to start of work.

4.0 REFERENCES

WHC, 1988, *Environmental Investigations and Site Characterization Manual*, WHC-CM-7-7, et. seq., Westinghouse Hanford Company, Richland, Washington.

WHC, 1992, *Sodium Dichromate Barrel Landfill ERA Proposal*, WHC-SD-EN-AP-112, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

Figure 1. Sodium Dichromate Barrel Landfill Site Map.

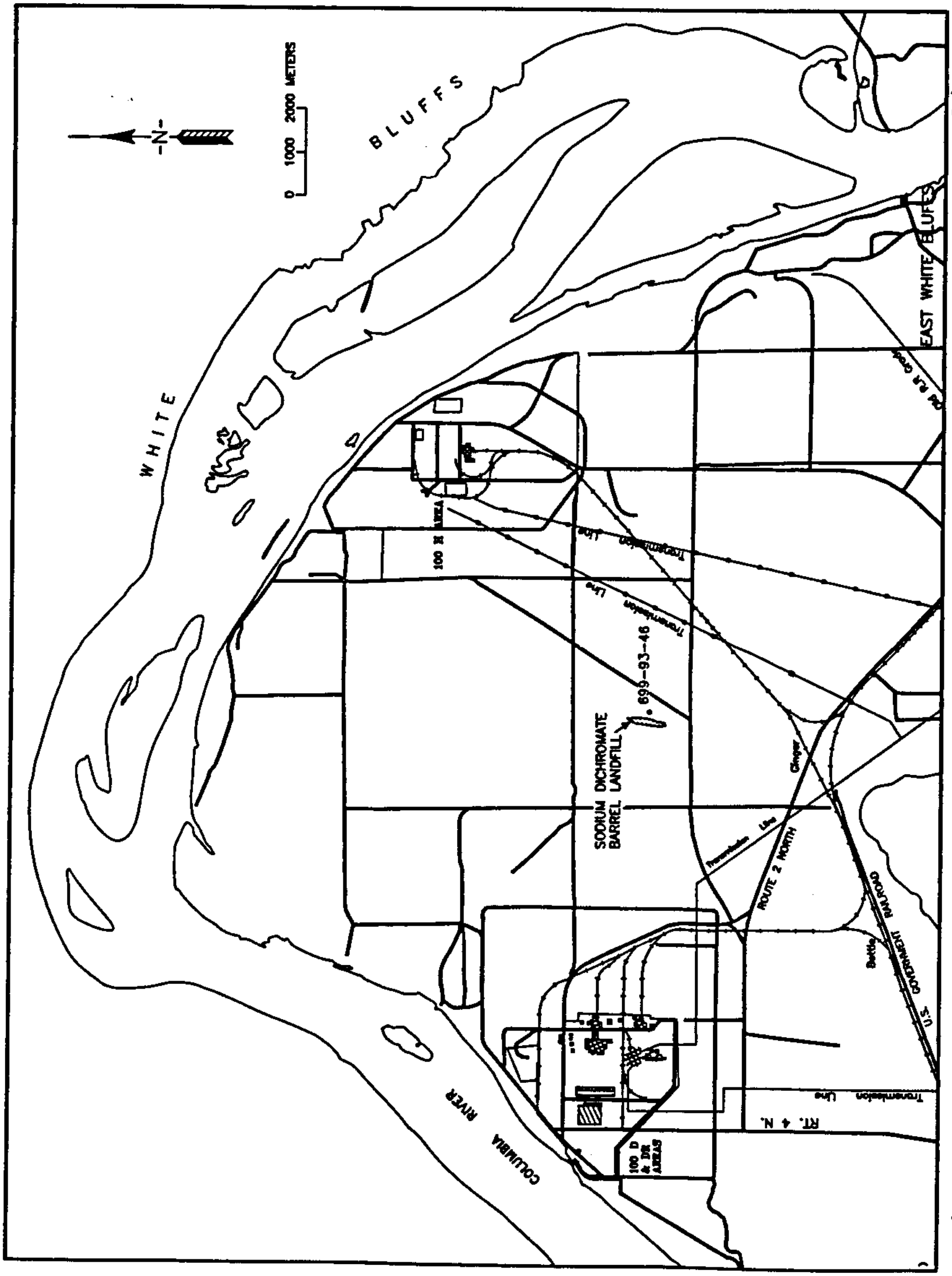
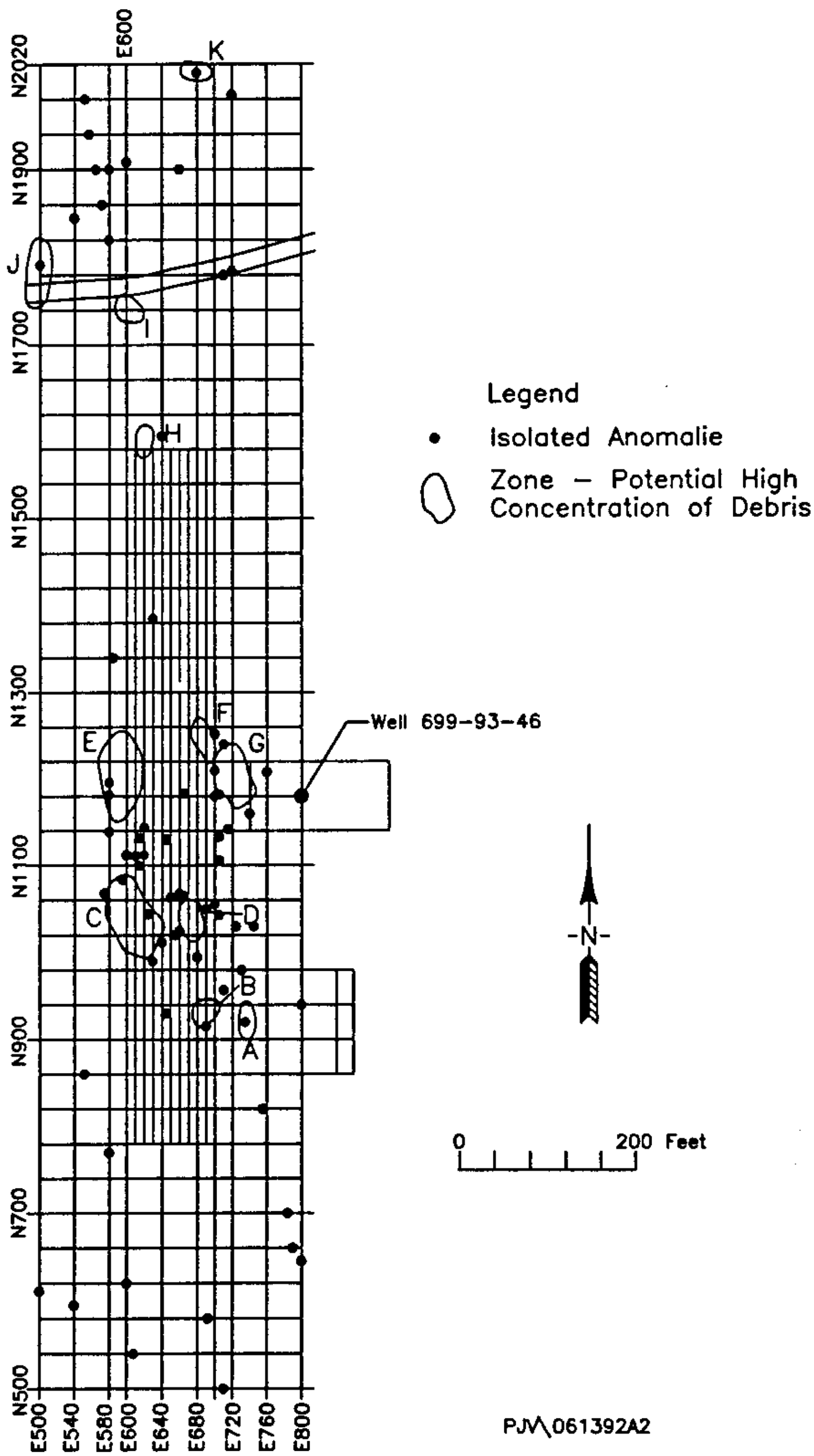


Figure 2. Geophysical Anomalies (Zones) Locations.



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APPENDIX A

PART 1 - FIELD SAMPLING PLAN

PART 2 - QUALITY ASSURANCE PROJECT PLAN

PART 1 - FIELD SAMPLING PLAN

CONTENTS

1.0 SAMPLING AND FIELD ACTIVITIES

1.1 CONTAMINANTS OF CONCERN

The primary hazardous constituent of concern is chromium and hexavalent chromium (chromium IV). Sample data from limited characterization have indicated only natural background levels of chromium.

Currently, the site is considered nonradioactive based on survey results. Due to the uncertainty of the drums origin and contents, total gamma energy analysis will be performed to verify the material as nonradioactive.

1.2 FIELD SCREENING

The field screening scope of soils includes correlation with laboratory data and release of excavations for backfilling. Only sites with crushed barrels will require field screening and soil sampling. Samples will be field screened for evidence of total chrome. An acid digestion (EPA Method 1310) for determining chromium VI and x-ray fluorescence (XRF) for total chromium are the screening methods to be used on collected soils.

As previously stated in Section 1.1, the site is considered nonradioactive. Radiation levels will be monitored periodically. Samples and debris leaving the site will be monitored and appropriately released. Any detections above background level shall cause all activities to stop. Health physics technicians (HPT) will be contacted for assistance.

During characterization activities, an organic vapor meter (OVM) was used for field screening of soils for volatile compounds. No organic vapor contamination was detected at any time. For cleanup activities, the site safety officer will monitor soils at his/her discretion.

All field screening activities will be recorded in the field logbook and if required, on a hazardous waste site monitoring log.

1.3 SAMPLE LOCATION

A 10- by 10-m grid system will be used for large excavated zones containing barrels. One field screening sample and laboratory sample will be collected for each 100 m^2. Soil at the last debris layer encountered will be field screened and sampled. For shallow isolated barrel(s), a soil sample will be taken directly underneath the barrel(s).

Additional sample collection will depend on the following criteria:

- Results of field monitoring and screening
- Discolored soil or unexpected conditions
- Field team leader discretion.

The field team leader will record all field findings, sampling activities, and locations in accordance with Environmental Investigation Instruction (EII) 1.5, Field Logbook (WHC 1988a).

1.3.1 Sample Collection

Sample collection will be from approximately the center of the backhoe bucket for excavated sites (>4 ft deep). Direct surface sampling may be used for shallow (<4 ft deep) buried barrels. Samples will be homogenized in clean stainless steel bowl prior to sampling. Each sample collection will use a separate decontaminated hand tool (i.e., spoon, trowel) per EII 5.2, Soil and Sediment Sampling (WHC 1988a).

Following collection, samples are labeled, packaged, and sent to a qualified laboratory for analysis. All samples sent for qualified laboratory analysis are labeled and tracked using Hanford Environmental Information System (HEIS) identification numbers per EII 5.10, Obtaining Sample Identification Numbers and Accessing HEIS Data (WHC 1988a). Sample packaging is done per EII 5.11, Sample Packaging and Shipping (WHC 1988a).

A chain of custody starts and is maintained when the sample is collected. The chain of custody is per EII 5.1 Chain of Custody (WHC 1988a).

1.3.2 Sample Schedule

Field activities are scheduled to start first of March 1993. An estimated 10 working days will be required to complete the cleanup activities. This schedule is subject to change and the cognizant project engineer should be contacted for current status. An Agreement Activity Notification form will be issued at least 5 days prior to the start of field work.

Excavated debris and crushed b arrels will b e stored at the site until field screening results allow release. Upon release, the excavated materials will be transported to the Central Landfill facility for disposal as solid waste.

Dust control, if required, will use a fine water spray to minimize water usage.

After all excavation activities are completed, the disturbed areas will be recontoured and reseeded.

1.4 FIELD ACTIVITIES

All geophysical identified anomalies will be investigated for excavation/debris removal. As described in Section 1.0 of the sampling and analysis plan, 11 zones will be excavated with a large trackhoe. The trenches will be constructed in compliance with EII 5.2, Soil and Sediment Sampling, Appendix I (WHC 1988a). Previous characterization activities of two zones revealed crushed barrels to depths of 8 ft. Excavations >4 ft will have 1 1/2 to 1 slopes. Excavations will remain open until field screening results are complete. Excavations will strictly adhere to guidelines stated in the health and safety plan and the job control work package.

The remaining 143 isolated anomalies will be staked and the immediate surrounding area surveyed with a metal detector. A small backhoe will excavate those anomalies indicating hits with the metal detector. No excavating will occur if nothing is found with the metal detector or if an obvious piece of homestead debris (i.e., tin can, wire) is on the surface. Geophysical surveys indicate the majority of these anomalies to be at a depth of <2 ft.

It is not anticipated that any hazardous wastes will be encountered. Any relatively pure forms of hazardous wastes identified, shall be segregated from the other excavated materials. These segregated materials shall be packaged separately for proper disposal.

2.0 ANALYSES

Qualified laboratory sample analysis shall be according to U.S. Environmental Protection Agency (EPA) protocols (EPA 1986). Laboratory sample analysis (Table FSP-1), excluding radiological parameters, shall satisfy Level IV or V requirements for verification and validation. Chromium VI is being requested for information only, a holding time of 24 hr cannot be met for off-site laboratory analysis.

Table FSP-1. Laboratory Sample and Analysis.

Parameters of Interest	Analytical Method (TMA/Weston)	Target Detection Limit	Precision	Accuracy
Chromium VI	SW-846-7196/SW-846-7197	0.1 ppm	±20%	±35%
Total chromium	CLP	1.0 ppm	±20%	±25%
TAL metals	CLP	per CRDL on limit	±35	75-125%
		0.5 pCi		
Gamma spec	RC-30/Pro-042-5		±35%	±35%

CLP = Contract Laboratory Procedure.
CRDL = Contract Required Detection Limit.
TAL = Target analyte list.

3.0 QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS

It is anticipated that approximately 35 samples will be collected for laboratory verification and validation. For every 20 samples, the following quality assurance (QA)/quality control (QC) samples shall be collected: (1) one duplicate sample, (2) one split sample, and (3) one equipment blank. The blank sample matrix will be silica sand to reflect soil.

Additional sampling may require additional QA/QC sample collections. The QA/QC sample quantity will be at the discretion of the field team leader.

4.0 MODIFICATIONS TO SAMPLING PLAN

Due to field conditions, the sampling plan may require changes. Minor changes will require, at least, the verbal approval of the field team leader and the cognizant project engineer. In this situation, the field team leader will submit changes on the Sampling Project Change Form (Figure FSP-1). An Engineering Change Notice will be released per EP-2.2, Engineering Document Change Control (WHC 1988b), by the project engineer and the project file will contain a copy. Major changes to the plan (i.e., changes to sampling parameters, Table FSP-1) will require lead regulatory agency concurrence on an approved Document Change Request Form.

5.0 REFERENCES

EPA, 1986, *Test Methods for Evaluating Solid Waste Physical/Chemical Methods.* SW-846, U.S. Environmental Protection Agency, Washington, D.C.

WHC, 1988a, *Environmental Investigations and Site Characterization Manual*, WHC-CM-7-7, et. seq., Westinghouse Hanford Company, Richland, Washington.

WHC, 1988b, *Standard Engineering Practices*, WHC-CM-6-1, et. seq., Westinghouse Hanford Company, Richland, Washington.

Figure FSP-1. Sodium Dichromate Barrel ERA Sampling Plan Change Form.

Date: ____________________

Person Initiating Change: ____

Change: ____

Reason For Change: ____

APPROVAL:

Field Team Leader: ____

Cognizant Engineer: ____

Environmental QA Representative: ______________________________________

PART 2 - QUALITY ASSURANCE PROJECT PLAN

CONTENTS

1.0 INTRODUCTION

The quality assurance project plan (QAPP) describes the QA requirements that support the Sodium Dichromate Barrel Landfill Expedited Response Action (ERA) cleanup activities (WHC 1992a). This QAPP presents the objectives, organizations, functional activities, procedures, specific QA and quality control (QC) protocols associated with these activities.

2.0 PROJECT DESCRIPTION

The ERA cleanup objective is to remove all debris and collect soil samples to verify clean closure. All anomalies will be investigated, soil sampled (sites with barrels only) and debris removed.

The sampling analysis plan, Section 1.0, contains the site's description.

3.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

QAPP responsibilities of key personnel and organizations are:

- Field Team Leader (Environmental Restoration Engineering). Responsible for onsite direction of the sampling team in compliance with the requirements of this QAPP, the field sampling plan, and all implementing environmental investigation instructions (EII).

- Cognizant QA Engineer (Environmental Quality Assurance). The QA person is responsible for performing formal audits/surveillances to ensure compliance with QAPP requirements (WHC 1990).

- Hanford Area Sample Management (HASM). HASM is responsible for coordinating qualified and approved laboratory support for all project analyses concerns, assisting in sample shipment tracking, resolving chain-of-custody issues, and when requested validating all related data.

- Qualified Analytical Laboratories. Soil samples shall be sent to a Westinghouse Hanford Company (WHC) approved contractor, participant subcontractor, or subcontractor laboratory. They shall be responsible for performing the analyses identified in this plan in compliance with work order, contractual requirements, and WHC approved procedures. Each laboratory shall have and comply with a written approved laboratory QA plan. All analytical laboratory work shall be subject to the surveillance controls invoked by quality instruction (QI) 7.3, <u>Source Surveillance and Inspection</u> (WHC 1989). This plan will meet the appropriate requirements of the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1991). HASM will retain prime responsibility for ensuring acceptability of offsite laboratory activities.

- Other Support Contractors. The project engineer may assign project responsibilities to other support contractors project responsibilities. Such services shall be in compliance with standard WHC procurement procedures as discussed in Section 5.0. All work shall comply with WHC approved QA plans/procedures.

4.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT

The QAPP's principal objective is to maintain the quality of field activities, sample handling, laboratory analysis, and to document each processing level.

The EPA devised an analytical level classification system (EPA 1987) which provides increased data quality as the scale increases. Level I consists of field screening methods. Level II entails more advanced onsite analytical techniques. Level III concerns standard laboratory program procedures. Level IV consists of EPA contract laboratory program procedures. Level V addresses specially developed procedures where standard methods are not available or requires a high degree of analytical sensitivity.

Westinghouse Hanford developed a site-specific analytical classification that fulfills the EPA data quality goals. It consists of two data quality levels: field or laboratory screening and validated laboratory analyses (McCain and Johnson 1990). Field or laboratory screening is equal to EPA Levels I, II, and III. Validated laboratory analyses are equal to EPA Levels IV and V.

The following is a list of the parameters of interest:

- Chromium VI
- Total chromium - per EPA Method 300.0 utilizing CLP's Special Analytical Services (SAS)
- Target analyte list (TAL) metals
- Gamma spectrum (SAS).

5.0 SAMPLING PROCEDURES

All sampling activities shall be consistent with the current applicable WHC (1988a) procedures and the sodium dichromate ERA cleanup sampling and analysis plan. These procedures are identified in the field sampling plan. They include:

- EII 1.4, Instruction Change Authorizations
- EII 1.5, Field Logbooks

- EII 1.6, QA Records Processing
- EII 1.7, Indoctrination, Training, and Qualification
- EII 3.4, Field Screening
- EII 5.1, Chain of Custody
- EII 5.2, Soil and Sediment Sampling
- EII 5.5, 1706 KE Laboratory Decontamination of RCRA/CERCLA Sampling Equipment
- EII 5.11, Sample Packaging and Shipping.

As noted in Section 3.0, procured participant contractor/subcontractor services shall be subject to the following (WHC 1989):

- QI 4.0, Procurement Document Control
- QI 4.1, Procurement Document Control
- QI 4.2, External Services Control
- QI 7.0, Control of Purchased Items and Services
- QI 7.1, Procurement Planning and Control
- QI 7.2, Supplier Evaluation
- QI 7.3, Source Surveillance and Inspection
- QI 17.0, Quality Assurance Records
- QI 17.1, Quality Assurance Records Control
- EII 1.6, QA Records Processing (WHC 1988a).

The procurement document shall specify that the contractor submit for WHC review and approval prior to use all analytical procedures and their QA/QC program. All participant contractor or subcontractor procedures, plans/manuals shall be retained as project quality records.

6.0 SAMPLE CUSTODY

Project samples shall be controlled per EII 5.1, Chain of Custody from the point of origin to the analytical laboratory and 222S Laboratory (total activity). Laboratory chain-of-custody procedures shall be reviewed and approved as required by WHC procurement control procedures as noted in Section 5.0. The contractor shall ensure the maintenance of sample integrity and identification throughout the analytical process. Offsite sample tracking will be performed by HASM procedure Sample Tracking.

Results of analyses shall be traceable to original samples through a unique code or identifier. WHC will assign the samples Hanford Environmental Information System (HEIS) sample numbers. All results of analyses shall be controlled as permanent project quality records.

7.0 CALIBRATION PROCEDURES

Calibration of all critical WHC measuring and test equipment, whether in existing inventory or newly purchased, shall be controlled as required by:

- QR 12.0, Control of Measuring and Test Equipment

- QI 12.1, Acquisition and Calibration of Portable Measuring and Test Equipment
- QI 12.2, Measuring and Test Equipment Calibration by User
- EII 3.1, User Calibration of Health and Safety Measuring and Test Equipment.

Routine field equipment operational checks shall be per applicable EII or procedures. Similar information shall be provided in WHC approved participant contractor or subcontractor procedures.

Participant contractor, or subcontractor laboratory analytical equipment calibrations shall be per applicable standard analytical methods. These shall be subject to WHC review and approval.

8.0 ANALYTICAL PROCEDURES

Procedures based on the referenced methods shall be selected or developed, and approved before use in compliance with appropriate WHC procedure/procurement control requirements as noted in Section 5.0.

9.0 DATA REDUCTION, VALIDATION, AND REPORTING

9.1 DATA REDUCTION AND DATA PACKAGE PREPARATION

All analytical laboratories shall be responsible for preparing a report summarizing the analysis results and a detailed data package. This includes all information necessary to perform data validation to the extent indicated by the minimum requirements Data shall be reported on a dry-weight basis. The data summary report format and data package content shall be defined in procurement documentation subject to WHC review and approval as noted in Section 5.0. As a minimum, laboratory data packages shall include the following:

- Sample receipt and tracking documentation, including identification of the organization and individuals performing the analysis, the names and signatures of the responsible analysts, sample holding time requirements, references to applicable chain of custody procedures, and the dates of sample receipt, extraction, and analysis.

- Instrument calibration documentation, including equipment type, model, initial and continuing calibration data, method of detection limits, and calibration procedure used.

- Additional QC data, as appropriate for the methods used including matrix spikes, duplicates, recovery percentages, precision data, laboratory blank data, and identification of any nonconformance that may have affected the laboratory's measurement system during the analysis time period.

- The analytical results or data deliverables, including reduce data, reduction formulas or algorithms, unique laboratory identifiers, and description of deficiencies.

- Other supporting information, such as reconstructed ion chromatographs, spectrograms, traffic reports, and raw data.

All sample data shall be retained by the analytical laboratory and made available for systems or program audit purposes on request by WHC, the U.S. Department of Energy (DOE), Richland Field Office (RL), or regulatory agency representatives. Such data shall be retained by the analytical laboratory through the duration of their contractual statement of work; at which point, it shall be turned over to WHC for archiving.

9.2 VALIDATION

The completed data package shall be reviewed and approved by the analytical laboratory's QA Manager before submittal to WHC for validation. Validation of the completed data package shall be performed by qualified WHC HASM or other contract personnel. Validation requirements will be defined within the approved procurement document or WHC HASM data validation procedures (WHC 1992b).

For analyses performed by qualified laboratories, validation reports shall be prepared. The results of these analyses will be substantiated with checks as applicable per the analytical procedure.

9.3 FINAL REVIEW AND RECORDS MANAGEMENT CONSIDERATIONS

All validation reports and supporting analytical data packages shall be subjected to a final technical review by qualified reviewers at the direction of the WHC project engineer. This will be done before data submittal to regulatory agencies or inclusion in reports or technical memoranda. All validation reports, data packages, and review comments shall be retained as permanent project quality records in compliance with EII 1.6, Records Management (WHC 1988a), and QA 17.0, Quality Assurance Records (WHC 1989). The project engineer will have the primary responsibility for dispositioning project related records and data.

10.0 INTERNAL QUALITY CONTROL

Sampling plan activities may be evaluated as part of the project's QC effort. All analytical samples shall be subject to in-process QC measures from the field to the laboratory and during laboratory processing. Laboratory analyses performance audits are implemented through the use of QA/QC samples sent to multiple laboratories. The data quality generated in this project will be operationally defined by the following internal QC sampling.

- Split samples shall be collected and submitted to separate laboratories for a measurement precision assessment

- Duplicate samples shall be collected and submitted to measure intralaboratory precision

- Equipment blanks (matrix-silica sand) shall be prepared and submitted to assess sampling equipment cleanliness

- Laboratory internal quality control checks performed per applicable protocol for the analysis. For chemical analysis, this must include data demonstrating achieved accuracy, precision, system calibration, and performance. Reportables will include:

  - Preparation and calibration blanks
  - Calibration verification standards
  - Matrix spikes
  - Duplicates
  - Control samples
  - Other supporting documentation.

The minimum requirements of this section shall be invoked in procurement documents or work orders, compliant with standard Westinghouse Hanford procedures as noted in Section 5.0.

11.0 PERFORMANCE AND SYSTEMS AUDITS

Program activities are subject to oversight by WHC QA personnel. Audits may address quality-affecting activities that include, but are not limited to, measurement system accuracy, intramural and extramural analytical laboratory services, field activities, and data collection, processing, validation, reporting, and management. WHC QA audits will be performed under the Standard Operating Procedure requirements of (WHC 1989).

System audit requirements are implemented in accordance with QI 10.4, Surveillance. All quality-affecting activities are subject to surveillance. The project engineer will interface with both the Environmental Field Services quality coordinator and the QA officer. The QA officer is responsible for providing independent formal audits/surveillances to ensure compliance with planned activities, and identify conditions adverse to or enhancing overall performance quality.

12.0 PREVENTIVE MAINTENANCE

All measurement and testing equipment used in the field and laboratory that directly affect analytical data quality shall be subject to preventive maintenance measures that ensure minimization of measurement system downtime. Field equipment maintenance instructions shall be as defined by the approved procedures governing their use. Laboratories shall be responsible for performing or managing the maintenance of their analytical equipment; maintenance requirements, spare parts lists, and instructions shall be included in individual methods or in laboratory QA plans, subject to Westinghouse Hanford review and approval. When samples are analyzed using EPA reference methods, the preventive maintenance requirements for laboratory analytical equipment are as defined in the procured laboratory's QA plan(s).

13.0 DATA QUALITY INDICATORS

13.1 DATA ASSESSMENTS BY ANALYTICAL FACILITY

Adherence to approved procedures will be sufficient for the majority of data reports. To the extent possible, performance-based standards will be the preferred method of assessment for precision and accuracy measurements. A familiar example is the use of control charts. Values exceeding a 3-sigma limit on well-established and appropriate control chart should be flagged when reported. Samples in the analytical batch should be rerun if possible, and those results also reported.

When appropriate performance-based standards are not available and referenced procedures do not specify, the following two rules may be used.

- Precision--The difference between laboratory duplicates will be subject to a control limit of 150% of the requested limit whenever both sample values exceed the estimated method detection limit (MDL). If the estimated MDL exceeds the requested limit, the higher value may be used to calculate the control limit. When either or both duplicates are below the estimated method detection limit, laboratory precision may be assessed by comparing identically spiked samples. Samples exceeding five times the control limit can be subject to a 20% relative percent difference limit, where:

  $$\text{Relative Percent Difference} = \frac{(S - D) \times 100}{((S+D)/2)}$$

  S = Sample concentration
  D = Duplicate sample concentration.

  Failure to meet a precision limit will require evaluation and corrective action as appropriate.

- Accuracy will be defined by percent recovery data where

  $$\%\ \text{Recovery} = \frac{(\text{Spiked Sample Result} - \text{Sample Result})}{\text{Spike Added}} \times 100$$

  When the sample result (SR) is less than the MDL, use SR=0 for the purpose of calculating the percent recovery. Spiked samples having concentrations two to five times greater of the requested detection limit or MDL will have recovery control limits of 50% to 150%. Spiked samples exceeding five times the estimated MDL will have recovery control limits of 75% to 125%. Failure to meet the control limit will require evaluation and corrective action as appropriate. Applicable samples not meeting the limit should be rerun using a postdigestion spike if possible. Postdigestion spikes should be made at two times the indigenous level or lower reporting limit, whichever is greater.

13.2 PROJECT LEVEL ASSESSMENTS

All data requested through HASM will be subject to validation procedures as previously described (Section 9.2). Completeness of requested analyses will be assessed and reported to the project engineer by WHC HASM or subcontractor. The EPA guidance suggests 80 to 85% validation is a reasonable expectation (EPA 1987).

Summary statistics for measurement precision and accuracy shall be prepared in conjunction with the data analysis.

Precision evaluation at the project level will address interlaboratory precision. Precision of environmental measurement systems is often a function of concentration. This relationship should be considered before selecting the most appropriate form of summary statistic. Simplistically, this relationship can usually be classified as falling into one of the following three categories.

1. Standard deviation (or range) is constant

2. Coefficient of variation (or relative range) is constant

3. Both standard deviation (or range) <u>and</u> coefficient of variation (or relative range) vary with concentration.

The pooled standard deviation or pooled coefficient of variation can be used to summarize data in categories 1 and 2, respectively. Category 3 will require either graphical summary of the data or specialized regression techniques.

Data quality assessments are generally made at concentrations typical of the observed range in routine analyses. In some situations, the typical value measurement will be below an estimated practical method, or instrument detection limit (i.e., an engineering zero). If a standard exists (or is to be set) at some positive finite value, quality assessment summaries may be desired at that level rather than the most representative concentration.

14.0 CORRECTIVE ACTIONS

Request for corrective action required as a result of surveillance reports, nonconformance reports, or audit activity shall be documented and dispositioned as required by QR 16.0, <u>Corrective Action</u>: QI 16.1, <u>Trending/ Trend Analysis</u>; and QI 16.2, <u>Corrective Action Reporting</u> (WHC 1989). Primary responsibilities for corrective action resolution are assigned to the project engineer and the QA engineer. Other measurement systems, procedures, or plan corrections that may be required as a result of routine review processes shall be resolved as required by governing procedures or shall be referred to the project engineer for resolution. Copies of all surveillance, nonconformance, audit, and corrective action documentation shall be routed to the project QA records on completion or closure.

15.0 QUALITY ASSURANCE PROJECT REPORTS

Special QA reports are not planned for this project. Project records will be maintained in conformance with standard operating procedure requirements of WHC (1988b). Project records will be maintained according to EII 1.6, QA Records Processing, and technical data will be dispositioned according to EII 1.11, Technical Data Management (WHC 1988a). Surveillance, nonconform-ance, audit, and corrective action documentation shall be routed to the project quality records on completion or closure of the activity. The final report shall include an assessment of the overall adequacy of the total measurement system with regard to the data quality objectives of the investigation.

16.0 REFERENCES

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